PATENT

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE
BEFORE THE BOARD OF PATENT APPEALS AND INTERFERENCES

In re the Application of
Pettitt (TI-28576)
Serial No. 09/945,295
Filed: August 31, 2001
For: Automated Color Matching for Tiled Projection System

Conf. No. 2019
Group Art Unit: 2624
Examiner: Hung

APPELLANT'S BRIEF

Commissioner for Patents
Washington, DC 20231

Dear Sir:

Appellant respectfully presents this brief in support of his appeal of the final rejection of claims in this case. The Notice of Appeal was filed on January 23, 2008, as indicated on the date of the automated receipt from the Patent and Trademark Office.

Real Party in Interest

The real party in interest in this application is Texas Instruments Incorporated.

Related Appeals and Interferences

The undersigned is aware of no related applications that are currently on appeal or in an interference that would be directly affected by this appeal, or that themselves directly affect or have a bearing on this appeal.

Status of the Claims

Claims 1, 4 through 13, 16, and 18 were finally rejected in the Office Action of October 24, 2007, and are the subject of the present appeal.

Claims 2, 3, 14, 15, 17, and 19 through 23 were canceled during prosecution.

Status of Amendments

No amendment was presented after the final rejection.

A Request for Reconsideration was filed on January 23, 2008. The arguments presented in that Request for Reconsideration were found to not be persuasive, as stated in the Advisory Action of February 21, 2008.

Summary of the Claimed Subject Matter

Tiled display systems, as known in the industry, refer to large scale video displays (12) formed as an array of separate display screens (TILE 1 through TILE 4). In the context of this invention, each of the display screens is the output of a separate projector (11). Each projector (11) receives a video signal, from a main controller (13) corresponding to its portion of the overall video image to be displayed by the whole, and projects that portion of the image at its corresponding "tile" of the screen array.[1]

The method of independent claim 1 and its dependent claims is directed to the color matching of the images displayed by these separate multiple projectors in such a "tiled" projection display system. Claim 1 recites that each of the multiple projectors (11) stores chromaticity data representing a color gamut of that projector, and stores luminance data representing the relative luminance of colors projected by that projector.[2] In the claimed method, these stored chromaticity and luminance data are communicated from each projector (11) to a main controller (13).[3] Color correction data are calculated for each projector (11), based on that projector's chrominance and luminance data,[4] and on a standard color gamut determined (44) to

[1] Specification of S.N. 09/945,295, page 1, line 2 through page 2, line 9; page 6, lines 7 through 12; Figure 1.
[2] Specification, *supra,* page 6, line 23 through page 7, line 12; page 15, lines 12 through 22.
[3] Specification, *supra,* page 6, line 23 through page 7, line 12.
[4] Specification, *supra,* page 17, line 11 through page 18, line 9.

be achievable by each of the projectors (11) in the system.[5] Image pixel values for each projector are then calculated (24, 48, 49) from input image data, and based on the color correction data for that projector.[6]

Independent claim 12 is an apparatus claim directed to a display system (10) including two or more projectors (11), each projector (11) operable to generate a portion of an image.[7] Each projector (11) includes a spatial light modulator,[8] and a memory[9] that stores chromaticity and luminance data for that projector. The display system (10) also includes a main controller (13) that receives the chromaticity and luminance data from each projector, and which in turn provides color correction data to the projectors (11).[10] Each projector (11) is also recited as including circuitry (34) that calculates the color corrected pixel values, based on the color correction data from the main controller.[11]

As stated in the specification, the claimed invention provides important advantages in tiled projection display systems, by enabling automatic color matching among the multiple tiles, without requiring tedious manual measurements and adjustment after installation.[12] A high fidelity color and luminance matched tiled display can thus be achieved, with easy and efficient installation and setup.

Grounds of Rejection to Be Reviewed On Appeal

The §103 rejection of claim 1 and its dependent claims

Claim 1 was finally rejected under §103 as unpatentable over the Oguchi et al. reference[13] in view of the Mendelson et al. reference[14]. Claims 4 and 10 were finally rejected under §103 as unpatentable over the Oguchi et al. reference in view of the Mendelson et al.

---

[5] Specification, *supra,* page 15, line 23 through page 16, line 7; Figures 4 and 5.
[6] Specification, *supra,* page 8, lines 7 through 14; Figures 2 and 4.
[7] Specification, *supra,* page 6, lines 2 through 12.
[8] Specification, *supra,* page 6, lines 13 through 22.
[9] *E.g.,* contained within a pixel processing unit 34. Specification, *supra,* page 9, lines 16 through 18.
[10] Specification, *supra,* page 6, line 22 through page 7, line 12.
[11] Specification, *supra,* page 8, lines 7 through 14; page 9, lines 11 through 18; Figures 2 and 3A.
[12] Specification, *supra,* page 4, lines 1 through 5.
[13] U.S. Patent No. 6,340,976 B1, issued January 22, 2002 to Oguchi et al., from an application filed August 17, 1999 via PCT International Application PCT/JP98/01709 filed April 15, 1998.
[14] U.S. Patent No. 6,559,826 B1, issued May 6, 2003 to Mendelson et al., from an application filed February 10, 2000, which is a continuation-in-part of application No. 09/187,161, filed on November 6, 1998, now abandoned.

reference, and further in view of the Sato reference[15]. Claim 5 was finally rejected under §103 as unpatentable over the Oguchi et al. reference in view of the Mendelson et al. reference, and further in view of the Onuma et al. reference[16]. Claim 6 was finally rejected under §103 as unpatentable over the Oguchi et al. reference in view of the Mendelson et al. reference, and further in view of the Noguchi reference[17]. Claim 7 was finally rejected under §103 as unpatentable over the Oguchi et al. reference in view of the Mendelson et al. reference, and further in view of the Yoshikuni reference[18]. Claims 8 and 9 were finally rejected under §103 as unpatentable over the Oguchi et al. reference in view of the Mendelson et al. reference, and further in view of the Appel reference[19]. Claim 11 was finally rejected under §103 as unpatentable over the Oguchi et al. reference in view of the Mendelson et al. reference, and further in view of the Gibson reference[20].

The §103 rejection of claim 12 and its dependent claims

Claims 12, 13, and 16 were finally rejected under §103 as unpatentable over the Oguchi et al. reference in view of the Mendelson et al. reference, and further in view of the Sato reference. Claim 18 was finally rejected under §103 as unpatentable over the Oguchi et al. reference in view of the Mendelson et al. and Sato et al. references, and further in view of the Gibson reference.

[15] U.S. Patent No. 6,467,910, issued October 22, 2002 to Sato.
[16] U.S. Patent No. 5,287,173,issued February 15, 1994 to Onuma et al.
[17] U.S. Patent No. 6,101,272, issued August 8, 2000.
[18] English language abstract of Japan Patent Publication 02-001351, dated January 5, 1990, based on an application filed by Yoshikuni.
[19] U.S. Patent No. 5,337,410, issued August 9, 1994 to Appel.
[20] U.S. Patent No. 5,253,043, issued October 12, 1993 to Gibson.

Argument

The Mendelson et al. reference is not prior art against the claims in this application

As summarized above, the final rejection of each of the claims in this case is based on the application of the Mendelson et al. reference. For the reasons stated below in this Brief, Appellant submits that the Mendelson et al. reference applied in each separate basis of rejection is not prior art to the claims on appeal in this application. Absent the availability of the teachings of the Mendelson et al. reference as prior art, each basis of the §103 final rejection necessarily falls.

The Mendelson et al. reference, applied in the final rejection against the claims on appeal, is U.S. Patent No. 6,559,826, which issued on May 6, 2003 from an application S.N. 09/502,255 filed February 10, 2000.[21] This U.S. Patent No. 6,559,826 claims priority, as a continuation-in-part, to an application S.N. 09/187,161, filed on November 6, 1998, now abandoned.[22] In addition, the Mendelson Patent also claims priority to a provisional application No. 60/171,017, filed on December 15, 1999.[23]

As has been developed during prosecution, this application on appeal claims priority to provisional application No. 60/229,625, filed August 31, 2000, and is entitled to an effective filing date of August 31, 2000.[24] Accordingly, the Mendelson Patent is not available as a reference under §102a or under §102(b) against the claims in this case, because its issue (and first publication) date is after the effective filing date of this application. During prosecution, Appellant submitted evidence of conception and diligent efforts toward reduction to practice that predate the February 10, 2000 filing date of the Mendelson Patent. The Examiner has apparently accepted that evidence.[25]

Therefore, Appellant submits that the only way in which the Mendelson Patent can be properly applied as prior art against the claims in this case is under §102(e), and only then if the effective date of the Mendelson Patent is the November 6, 1998 filing date of the now-

[21] Hereinafter referred to as the "Mendelson Patent".
[22] Hereinafter referred to as the "Mendelson Parent Application".
[23] Priority to this provisional application is not relevant to this application, as discussed below.
[24] 35 U.S.C. §119(e).
[25] Office Action of October 24, 2007, pages 2 and 3.

abandoned Mendelson Parent Application, to which the Mendelson Patent claims priority under 35 U.S.C. §120 as a continuation-in-part. If the Mendelson Patent is not entitled to this effective date, and considering that each basis of the final rejection applies the teachings of the Mendelson Patent, the final rejection is in error.

i. Entitlement of a patent reference to a parent application filing date requires support in the parent application for a claim in the patent reference

The domestic priority statute, 35 U.S.C. §120, reads:

> An application for patent for an invention disclosed in the manner provided by the first paragraph of section 112 of this title in an application previously filed in the United States, or as provided by section 363 of this title, which is filed by an inventor or inventors named in the previously filed application shall have the same effect, as to such invention, as though filed on the date of the prior application . . . .[26]

It is axiomatic, given this statute, that for a patent to be entitled to the priority of a previously-filed application, the "invention" *of that patent* must be disclosed in the previously-filed application. In other words, at least one claim of that patent must be fully supported by the previously-filed application, in order for the patent to be afforded the priority of the previously-filed application.[27]

Appellant submits that this test applies in determining the effective filing date of an issued U.S. Patent, claiming priority under §120 as a continuation-in-part, for purposes of its effective date as a prior art reference under §102(e). The decision of the Court of Customs and Patent Appeals, the predecessor court to the Court of Appeals for the Federal Circuit, in the case of *In re Wertheim and Mishkin*,[28] is exactly on point. In that case, the Patent and Trademark Office had rejected an application under §103, based on a combination of references that

---

[26] 35 U.S.C. §120.

[27] *See also* MPEP §2133.01 ("When applicant files a continuation-in-part whose claims are not supported by the parent application, the effective filing date is the filing date of the child CIP."); MPEP §201.08 ("Unless the filing date of the earlier nonprovisional application is actually needed, for example, in the case of an interference or to overcome a reference, there is no need for the Office to make a determination as to whether *the requirement of 35 U.S.C. 120, that the earlier nonprovisional application discloses the invention of the second application in the manner provided by the first paragraph of 35 U.S.C. 112, is met* and whether a substantial portion of all of the earlier nonprovisional application is repeated in the second application in a continuation-in-part situation.") (emphasis added).

[28] *In re Wertheim et al.,* 646 F.2d. 527, 209 USPQ 554 (CCPA, 1981).

included a Pfluger patent, applied as prior art under §102(e) by virtue of the filing date of a parent application ("Pfluger I"), later abandoned, from which the Pfluger patent claimed priority (indirectly) as a continuation-in-part. The particular subject matter in the Pfluger patent that was relied upon for the rejection was found to be present in the abandoned parent application.[29] The rejection thus stood or fell on the question of whether the Pfluger patent was entitled to the effective filing date of the parent application.[30] The court held:

> Thus, the determinative question here is whether the invention claimed in the Pfluger patent finds a *supporting disclosure in compliance with §112,* as required by §120, in the 1961 Pfluger I application so as to entitle that invention in the Pfluger patent, as "prior art," to the filing date of Pfluger I. Without such support, the invention, and its accompanying disclosure, cannot be regarded as prior art as of that filing date.
>
> As previously noted, new matter can add material limitations which transform an unpatentable invention, when viewed as a whole against the prior art, into a patentable one. A continuation-in-part application, unlike a continuation application, does not necessarily insure that all critical aspects of the later disclosure were present in the parent. Thus, in a situation such as this, only an application disclosing the patentable invention before the addition of new matter, which disclosure is carried over into the patent, can be relied upon to give a reference disclosure the benefit of its filing date for the purpose of supporting a §§102(e)/103 rejection.[31]

The court found that the Pfluger I parent application did not constitute "a full, clear, concise and exact description in accordance with §112, first paragraph, of the invention *claimed* in the reference patent",[32] and that the Pfluger patent was therefore not entitled to the filing date of the Pfluger I parent application.[33] The court further stated:

> The dictum in *Lund*, *supra*, that * * * the continuation-in-part application is entitled to the filing date of the parent application as to all subject matter *carried over* into it from the parent application * * * for purposes of * * * utilizing the *patent* disclosure as evidence to defeat another's right to a patent * * * [emphasis in original] is hereby *modified* to further include the requirement that the

[29] *Id.,* USPQ at 557, 559.
[30] *Id.,* USPQ at 557.
[31] *Id.,* USPQ at 564.
[32] *Id.,* USPQ at 565 (emphasis added).
[33] *Id.*

> application, the filing date of which is needed to make a rejection, must disclose, pursuant to §§120/112, the invention claimed in the reference patent.[34]

Appellant therefore submits that, for a patent to be entitled to the priority of a previously-filed application, for use as a prior art reference, the "invention" *of that patent* must be disclosed in the previously-filed application.[35]

ii. The Examiner has not applied the proper test in determining the effective date of the Mendelson et al. reference

Each basis of the final rejection of claim 1 and its dependent claims is grounded on the determination that the Mendelson Patent is entitled to the filing date of the Mendelson Parent Application, which is a date earlier than the date of the invention established by Appellant by way of declaration.[36] In making the final rejection, the Examiner expressly stated the rationale for awarding the earlier effective filing date to the Mendelson Patent:

> The Mendelson reference is a continuation-in-part of 09/187,161,[37] which has a filing date of 11/06/1998, earlier than 08/17/1999, the date the patent disclosure shown in Exhibit A (part of the 09/10/07 response) was prepared, as applicant asserted in the 09/10/07 declaration. *The '161 application contains sufficient support, in compliance with 35 U.S.C. §112, ¶1, for the subject matter relied upon to make the rejection.* (For example, see Figs 6, 7 and 9 and pp. 21-23 of the '161 application.) Therefore, the effective filing date of Mendelson, at least regarding the subject matter relied upon for the rejection, is November 6, 1998, not February 10, 2000 as applicant contended.[38]

It is evident from this statement that the Examiner looked only to whether the parent application contained "the subject matter relied upon to make the rejection", in deciding whether to award the filing date of the Mendelson Parent Application as the effective date of the Mendelson Patent. Neither this Office Action, nor any other Office Action in the prosecution of this case, presents a determination of whether any *claims* in the Mendelson Patent are supported by the disclosure of the Mendelson Parent Application.

---

[34] *Id.,* USPQ at 566 (emphasis in original), *citing In re Lund et al.,* 54 CCPA 1361, 376 F.2d 982, 153 USPQ 625 (CCPA, 1967).
[35] *See also Ex parte Ashkenazi et al.,* 2005 WL 3694317, 80 USPQ2d 1753 (Bd. Pat. App. & Interf., 2005).
[36] Office Action of October 24, 2007.
[37] The "Mendelson Parent Application".
[38] Office Action of October 24, 2007, pp. 2 and 3 (emphasis added).

Appellant responded to the final rejection by arguing, *inter alia,* that the Examiner failed to show that at least one claim of the Mendelson Patent was supported by the Mendelson Parent Application.[39] The Examiner in turn responded to Appellant's argument, in the Advisory Action, by restating the same rationale on which the final rejection was based, along with an express statement that the test urged by Appellant is inapplicable:

> However, *regardless whether at least one claim of "that patent" (the Mendelson patent U.S. 6,559,826 at issue) is fully supported by the previously-filed application* (the '826 patent's parent application S.N 09/187,161), Applicant is directed to MPEP 2136.03(IV), which states
>
> > For prior art purposes, a U.S. patent or patent application publication that claims the benefit of an earlier filing date under 35 U.S.C. 120 of a prior nonprovisional application would be accorded the earlier filing date as its prior art date under 35 U.S.C. 102 (e), provided the earlier-filed application properly supports the subject matter relied upon in any rejection in compliance with 35 U.S.C. 112, first paragraph. In other words, the subject matter used in the rejection must be disclosed in the earlier-filed application in compliance with 35 U.S.C. 112, first paragraph, in order for that subject matter to be entitled to the earlier filing date under 35 U.S.C. 102(e).[40]

The final rejection was maintained.

Appellant therefore submits that the Examiner has not applied the correct test in determining whether the Mendelson Patent is entitled, under §120, to the filing date of the Mendelson Parent Application, in rejecting the claims in this case. While the MPEP test cited by the Examiner is a *necessary* condition to apply the earlier filing date,[41] that MPEP test is not a *sufficient* condition. Rather, the *Wertheim* decision teaches us that the later-issued patent must itself be entitled to the filing date of the parent application, by virtue of *its* claimed invention being supported by the previously-filed application, in order for that later-issued patent to be

[39] *See* Request for Reconsideration of January 23, 2008, page 4.
[40] Advisory Action of February 21, 2008, page 2 (emphasis added).
[41] The previously-filed application must of course contain the "subject matter relied on" in order to show that the knowledge was present in the prior art before the applicant's invention.

entitled to the filing date of the parent application for purposes of determining its effective date as a prior art reference.[42]

Because the Examiner did not consider whether claims in the Mendelson Patent are properly supported, under §112, first paragraph, by the Mendelson Parent Application in determining that the Mendelson Patent is entitled to the filing date of the Mendelson Parent Application, Appellant submits that the Examiner's application of the Mendelson Patent as prior art is in error. Appellant submits that the final rejection is accordingly in error.

iii. The Mendelson et al. reference is not entitled to the filing date of its parent application

Appellant further submits that, under the proper legal test, the Mendelson Patent is in fact not entitled to the effective filing date of the Mendelson Parent Application, because none of the claims of the Mendelson Patent are supported by the Mendelson Parent Application.

The Mendelson Patent has three independent claims: claims 1, 8, and 13. Each of these claims include at least one step or element that is not supported by the Mendelson Parent Application. Specifically, independent claim 1 includes the step of:

> c) calculating a current luminance ratio from said first luminance value and said second luminance;

Independent claim 8 includes the element of:

> means for calculating a current luminance ratio of said display from said first luminance value and said second luminance value;

And independent claim 13 includes the step of

> calculating a current luminance ration[sic] on said first luminance value and said second luminance value;

Appellant submit that this step or element in the independent claims of the Mendelson Patent, *inter alia*, is not supported by the Mendelson Parent Application.

To the extent that the specification of the Mendelson Parent Application mentions "luminance" at all,[43] that specification makes no mention whatsoever of "calculating a current

---

[42] *See also Ashkenazi, supra.*

[43] Specification of S.N. 09/187,161 (as provided by the Examiner with the Advisory Action of February 21, 2008), page 17, line 15 through page 18, line 2; page 23, lines 11 through 23; page 28, lines 8 through 18.

luminance ratio" as required by each of the claims of the Mendelson Patent. This reading of the specification of the Mendelson Parent Application is consistent with the original claims as filed in the Mendelson Parent Application, none of which refer to or otherwise mention the calculating of a luminance ratio. At most, original independent claim 18 of the Mendelson Parent Application refers to "measuring actual luminance values" and to "analyzing said actual luminance values", and its dependent claim 23 refers to "comparing said actual luminance values with said nascent chromatic characteristics of said liquid crystal display screen",[44] but neither claim recites or mentions the calculating of any luminance ratio. The Mendelson Parent Application provides no disclosure whatsoever, much less disclosure sufficient under §112, first paragraph, of the calculating of a luminance ratio.

Rather, review of the specification of the Mendelson Patent itself readily shows that support for the claim step or claim element reciting the calculating of a luminance ratio is from the new matter added in this continuation-in-part, as compared with the content of its parent application. Specifically, a new step 935 is presented in the specification of the Mendelson Patent:

> At step 935, the present embodiment *calculates the luminance ratios* at various lamp intensity settings (e.g., settings 2 , 3 and 4 of Table 1) with respect to the luminance at the maximum intensity setting (e.g., setting 1 of Table 1). For example, the luminance value measured at setting 2 is divided by the luminance value measured at setting 1. [45]

Not only does this paragraph not appear in the Mendelson Parent Application, this new paragraph appears in the Mendelson Patent as *inserted between* two paragraphs that were previously present in the Mendelson Parent Application.[46] And in the Figures, not only does this step 935 not appear in Figure 9 of the Mendelson Parent Application, but corresponding Figure 9 of the Mendelson Patent shows this step 935 as *inserted between* steps 930 and 940, which were present in the Mendelson Parent Application. The paragraph quoted above, and the step 935 that it introduces, are thus obviously new matter relative to the Mendelson Parent Application, presented in the continuation-in-part that became the Mendelson Patent. Additional support for

[44] *Id.,* page 35, line 20 through page 36, line 3; page 36, line 21 through page 37, line 2.
[45] Mendelson et al., *supra,* column 13, lines 9 through 14; Figure 9 (emphasis added).
[46] Mendelson Parent Application, *supra,* page 27, line 18 through page 28, line 18.

the step and element of calculating luminance ratios also appears at the new portions of the Mendelson Patent relating to its Figures 10A, 10B, and 11,[47] as compared with the contents of the Mendelson Parent Application.[48]

Appellant therefore respectfully submits that no claim of the Mendelson Patent is supported by the Mendelson Parent Application, because each of the independent claims in the Mendelson Patent recites a step or element that is not disclosed in the Mendelson Parent Application, to which the Mendelson Patent claims priority as a continuation-in-part. Appellant thus submits that the Mendelson Parent Application does not disclose, pursuant to 35 U.S.C. §120 and 35 U.S.C. §112, the invention that is claimed in the Mendelson Patent. And because the Mendelson Parent Application does not disclose the invention claimed in the Mendelson Patent, Appellant submits that the effective date of the Mendelson Patent does not extend to the filing date of the Mendelson Parent Application.[49]

iv. The Mendelson et al. reference is not prior art to the claims in this case

As discussed above, the Mendelson Patent issued on May 6, 2003 from an application S.N. 09/502,255 filed February 10, 2000. The Mendelson Patent claims priority to the Mendelson Parent Application, as a continuation-in-part, which has a filing date of November 6, 1998.[50]

This application on appeal claims priority to provisional application No. 60/229,625, filed August 31, 2000, and is entitled to an effective filing date of August 31, 2000. Accordingly, the Mendelson Patent is not available as a reference against the claims in this case, under §102(a) or under §102(b), because its issue (and first publication) date is after the effective filing date of this application.

---

[47] Mendelson et al., *supra,* column 15, line 53 through column 16, line 6; Figure 11.
[48] Which does not include these new Figures 10A, 10B, and 11.
[49] *In re Wertheim et al., supra.*
[50] The Mendelson Patent also claims priority to a provisional application No. 60/171,017, filed on December 15, 1999. Priority to this provisional application has not been asserted by the Examiner as an effective date of the reference in the prosecution of this application. As the burden lies with the Examiner to make such an assertion, Appellant presumes that the priority claim to this provisional application is not relevant to the rejection.

During prosecution, Appellant submitted evidence of conception and diligent efforts toward reduction to practice that predate the February 10, 2000 filing date of the Mendelson Patent. A copy of that evidence, in the form of a Declaration by the named inventor, is included with this Brief in the Evidence Appendix. Appellant submits that this evidence is sufficient to establish conception and diligent efforts toward reduction to practice from a time prior to February 10, 2000, such efforts resulting in actual reduction to practice.[51] Therefore, Appellant submits that the only way in which the Mendelson Patent can be properly applied as prior art against the claims in this case is under §102(e), and only then if the effective date of the Mendelson patent is the November 6, 1998 filing date of the now-abandoned Mendelson Parent Application, to which the Mendelson Patent claims priority under 35 U.S.C. §120 as a continuation-in-part.

However, for the reasons stated in detail above, Appellant submits that the Mendelson Patent is not entitled to the filing date of the Mendelson Parent Application as its effective date for purposes of establishing its prior art effect. The proper effective date of the Mendelson Patent for purposes of its prior art effect to the claims in this case is therefore February 10, 2000,[52] which Appellant has antedated by way of declaration evidence. Therefore, Appellant submits that the Mendelson et al. reference is not prior art against the claims in this case.

Claim 1 and its dependent claims

Claim 1 was finally rejected under §103 as unpatentable over the Oguchi et al. reference in view of the Mendelson et al. reference. Claims 4 and 10 were finally rejected under §103 as unpatentable over the Oguchi et al. reference in view of the Mendelson et al. reference, and further in view of the Sato reference. Claim 5 was finally rejected under §103 as unpatentable over the Oguchi et al. reference in view of the Mendelson et al. reference, and further in view of the Onuma et al. reference. Claim 6 was finally rejected under §103 as unpatentable over the Oguchi et al. reference in view of the Mendelson et al. reference, and further in view of the Noguchi reference. Claim 7 was finally rejected under §103 as unpatentable over the Oguchi et

[51] The Examiner has apparently accepted this evidence as well. *See* Office Action of October 24, 2007, pages 2 and 3.

[52] As noted *supra,* the Examiner has not asserted that the Mendelson Patent is entitled to the effective filing date of its provisional application, for purposes of establishing its prior art effect in this case.

al. reference in view of the Mendelson et al. reference, and further in view of the Yoshikuni reference. Claims 8 and 9 were finally rejected under §103 as unpatentable over the Oguchi et al. reference in view of the Mendelson et al. reference, and further in view of the Appel reference. Claim 11 was finally rejected under §103 as unpatentable over the Oguchi et al. reference in view of the Mendelson et al. reference, and further in view of the Gibson reference.

As evident from the foregoing, each basis of the final rejection against each of claim 1 and its dependent claims applies the Mendelson et al. reference in combination with one or more other prior art references under §103. For the reasons stated above, Appellant submits that the Mendelson et al. reference is not prior art to the claims on appeal in this application. Absent the availability of the teachings of the Mendelson et al. reference as prior art, each basis of the final rejection of claim 1 and its dependent claims, under §103, necessarily falls.

Appellant therefore submits that the final rejection of claim 1 and its dependent claims is in error, and should be reversed.

Claim 12 and its dependent claims

Claims 12, 13,and 16 were finally rejected under §103 as unpatentable over the Oguchi et al. reference in view of the Mendelson et al. reference, and further in view of the Sato reference. Claim 18 was finally rejected under §103 as unpatentable over the Oguchi et al. reference in view of the Mendelson et al. and Sato et al. references, and further in view of the Gibson reference.

As evident from the foregoing, each basis of the final rejection, against each of claim 12 and its dependent claims, applies the Mendelson et al. reference in combination with one or more other prior art references under §103. For the reasons stated above, Appellant submits that the Mendelson et al. reference is not prior art to the claims on appeal in this application. Absent the availability of the teachings of the Mendelson et al. reference as prior art, each basis of the final rejection of claim 12 and its dependent claims, under §103, necessarily falls.

Appellant therefore submits that the final rejection of claim 12 and its dependent claims is in error, and should be reversed.

In conclusion

For the foregoing reasons, Appellant respectfully submits that the final rejection under §103 of claims 1, 4 through 13, 16, and 18 is in error. Reversal of the final rejection of the claims in this case is therefore respectfully requested.

Respectfully submitted,
/Rodney M. Anderson/
Rodney M. Anderson
Registry No. 31,939
Attorney for Appellant

Anderson, Levine & Lintel, L.L.P.
14785 Preston Road, Suite 650
Dallas, Texas 75254
(972) 664-9554

Claims appendix:

1. A method of color matching images generated by multiple projectors of a tiled projection display system, comprising the steps of:

providing at least two projectors, each having chromaticity data representing a color gamut of that projector stored therein, and having luminance data representing the relative luminance of colors generated by that projector stored therein;

communicating each projector's stored chromaticity and luminance data to a main controller;

determining a standard color gamut achievable by each said projector;

calculating color correction data for each projector, based on that projector's chromaticity data, luminance data, and on said standard color gamut; and

calculating image pixel values based on input image data and said color correction data.

4. The method of Claim 1, wherein each of said projectors include spatial light modulators at which light is directed from a light source through a rotating color wheel;

and wherein said stored luminance data for a projector represents effective light times of each color of the color wheel for that projector relative to a base color wheel rate.

5. The method of Claim 1, further comprising the step of adjusting the gain of the color correction data based on the luminance data.

6. The method of Claim 1, wherein the communicating step comprises communicating each projector's chromaticity data in the form of a transfer function matrix.

7. The method of Claim 1, further comprising:

calculating chromaticity data for each projector from primary and white color values.

8. The method of Claim 1, said determining and calculating color correction data steps performed by at least one component selected from the group consisting of:

a processing system in data communication with each projector, and

at least one projector functioning at least partially as the main controller.

9. The method of Claim 1, wherein said determining and calculating color correction data steps are performed by one of said projectors.

10. The method of Claim 1, further comprising:

generating images at each projector, from the calculated image pixel values, and using a spatial light modulator.

11. The method of Claim 1, wherein the calculating calculates the color correction data from primary and secondary colors.

12. A display system comprising:

at least two projectors, each said projector operable to generate a portion of an image, each projector comprising:

a spatial light modulator, for generating its portion of the image responsive to pixel values for each of a plurality of color components;

a memory, for storing chromaticity data and luminance data for that projector, the luminance data representing the relative luminance of the colors generated by the spatial light modulator responsive to the pixel values; and

a main controller, coupled to each of the at least two projectors to receive the stored chromaticity and luminance data therefrom and to communicate corrected pixel values thereto, the main controller comprising circuitry for generating color correction data for each projector based on the received chromaticity and luminance data, and for communicating the color correction data for each projector to that projector;

wherein each projector further comprises circuitry for calculating corrected pixel values based on said color correction data.

13. The display system of Claim 12, wherein the spatial light modulator in at least one of said at least two projectors comprises:

a digital micro mirror device;

a light source; and

a color wheel disposed between the light source and the digital micro-mirror device.

16. The display system of Claim 13, wherein the luminance data of each of the projectors represents effective light times of colors of the color wheel in that projector relative to a base color wheel rate.

18. The display system of Claim 12, wherein the color correction data is derived from primary and secondary colors.

Evidence appendix:

Declaration of Gregory S. Pettitt, dated September 10, 2007.

PATENT

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re the Application of

Pettitt (TI-28576) Conf. No. 2019

Serial No. 09/945,295 Group Art Unit: 2624

Filed: August 31, 2001 Examiner: Hung

For: Automated Color Matching for Tiled Projection System

DECLARATION OF GREGORY S. PETTITT

Commissioner for Patents

P.O. Box 1450

Alexandria, VA 22313-1450

Dear Sir:

I, Gregory S. Pettitt, hereby declare:

1. I am the named inventor in this patent application.

2. I have been employed by Texas Instruments Incorporated, in Dallas, Texas, since at least as early as August 17, 1999.

3. Exhibit A to this Declaration is a true and correct copy of a patent disclosure prepared by me, in the United States, and submitted to the Patent Department of Texas Instruments Incorporated. This patent application, S.N. 09/945,295, was prepared from this patent disclosure. I prepared this patent disclosure at least as early as August 17, 1999. This patent disclosure was read and understood by others, in the United States, at least as early as August 17, 1999, as evidenced by their signatures on the last page. On information and belief, this patent disclosure was received by the Patent Department of Texas Instruments Incorporated

at least as early as August 17, 1999, as indicated by the "Received" stamp on each page of this patent disclosure.

4. The invention described in the patent disclosure of Exhibit A, and described in this patent application S.N. 09/945,295, has been embodied into a hardware function and embedded software in at least one application-specific integrated circuit (ASIC) manufactured and sold by Texas Instruments Incorporated. One such ASIC is referred to as the DDP 1000 DMD Controller, and has been used and sold in the United States.

5. Efforts and activity toward design and manufacture of the DDP 1000 DMD Controller began in the United States at least as early as February 10, 2000, and were continuing in the United States from at least as early as February 10, 2000 until successful manufacture of the DDP 1000 DMD Controller, and testing of that ASIC in the United States.

6. Exhibit B to this Declaration is a slide, dated February 20, 2002, which was shown and displayed to personnel of Texas Instruments Incorporated in the United States. This slide of Exhibit B indicates that efforts toward design and manufacture of the DDP 1000 DMD Controller began at least as early as February 10, 2000, and continued to the manufacture of prototypes.

7. Exhibit C to this Declaration is a slide, dated earlier than February 10, 2000, which was shown and displayed to personnel of Texas Instruments Incorporated in the United States. This slide of Exhibit C indicates the status of efforts toward the design and manufacture of the DDP 1000 DMD Controller, and specifically indicates that the VHDL Code, initial synthesis, and modeling of the PCC block was complete at that time. The PCC block of the DDP 1000 DMD Controller is a hardware function that, in combination with embedded software, embodies the invention described in the patent disclosure of Exhibit A and described and claimed in this patent application S.N. 09/945,295.

8. I hereby declare that all statements made herein of my own knowledge are true and that all statements made on information and belief are believed to be true; and further that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under Section 1001 of Title 18 of the United

States Code and that such willful false statements may jeopardize the validity of the application or any patent issued thereon.

Gregory S. Pettitt

Date: 09/16, 2007

EXHIBIT A

DOCKET NO. TI 28576

2040
CAB

1. **Please suggest a descriptive name for your invention:**

Automated color correction of tiled projection systems

2. **What is the problem solved by your invention?**

Current tiled or video wall systems must be individually measured and adjusted in order to match color and brightness of each projector. Many current systems adjust only the white of the system, as it would take to long too perform a measure of red, green, blue and white. But as the tiled or video wall systems pursue enhanced performance, the complete color and brightness correction of the walls must be included.

3. **What is your solution to the problem?**

Each DLP DME engine is measured and calibrated as it is using the 2-bit RGBY algorithm. In the process of these measurements, certain information about the colorimetry of the engine can be determined. The current color wheels for these engines contain an EPROM, in which the calibration information for the engines are stored. This information is derived from color measurements of the engine. The following is the calibration equations used in the DME setup. From these equations, the information needed for the adjustment of the colorimetry is found. This information is contained in the engine's system transfer function matrix, M.

The signal flow diagram of a typical engine is shown in Figure 1. The first color space conversion (CSC1) matrix is used to convert from the YCrCb color space to RGB. The degamma function removes the gamma from the signal. The RGB signal is now in a linear space. The RGBY gain is applied to the signal, then the second color space conversion (CSC2) matrix is used to convert the gained RGB signal to the color corrected color space, thus providing a match between engines. The feedback between RGBY and CSC2 provides a mechanism to improve color correction given the use of white peaking.

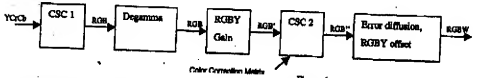


Figure 1

The engine color correction is accomplished using the system transfer function matrices. Each engine transfers it's tranafer matrix, M, to a master controller, and the CSC2 needed for each engine is calculated. Additional information on the luminance level of each engine is also provided.

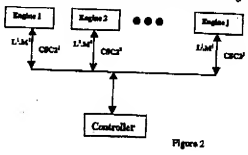


Figure 2

RGBY Calibration equations

Step 1: Measure chromaticities and luminance's at one standard wheel rate.

PR650	Luminance
X_R, Y_R, Z_R	Y'_{RGB}
X_G, Y_G, Z_G	Y'_{WS}
X_B, Y_B, Z_B	
X_{WS}, Y_{WS}, Z_{WS}	

Define: $X_{RGB} = X_R + X_G + X_B$

$Y_{RGB} = Y_R + Y_G + Y_B$

$Z_{RGB} = Z_R + Z_G + Z_B$

Using ELT's from standard wheel rate: $ELT_R^S, ELT_G^S, ELT_B^S, ELT_{WS}^S$

then each of the XYZ measurements for each color can be adjusted for additional wheel rates:

$$X^N_\phi = X_\phi \cdot \frac{ELT_\phi^N}{ELT_\phi^S} \qquad Y^N_\phi = Y_\phi \cdot \frac{ELT_\phi^N}{ELT_\phi^S} \qquad Z^N_\phi = Z_\phi \cdot \frac{ELT_\phi^N}{ELT_\phi^S}$$

where

$\phi = R, G, B, WS$

ELT_ϕ^S is the standard wheel rate ELT for a given color ϕ

ELT_ϕ^N is the ELT for wheel rate N for a given color ϕ

and $X^N_\phi, Y^N_\phi, Z^N_\phi$ are the new adjusted measurement for the given wheel rate N

each of the steps is then carried out for each wheel rate.

Step 2: Find α and β, and compute white segment colorimetry

$$\alpha = \frac{Y'_{RGB} \cdot Y_{WS}}{Y'_{WS} \cdot Y_{RGB}} \qquad \beta = \frac{Y'_{WS}}{Y'_{RGB}} \quad (y-ratio)$$

$$X'_{WS} = \alpha \cdot X_{WS} \qquad Y'_{WS} = \alpha \cdot Y_{WS} \qquad Z'_{WS} = \alpha \cdot Z_{WS}$$

Step 3: Form sums and matrix

$S_R = X_R + Y_R + Z_R \qquad S_{RGB} = X_{RGB} + Y_{RGB} + Z_{RGB}$

$S_G = X_G + Y_G + Z_G \qquad S_{WS} = X'_{WS} + Y'_{WS} + Z'_{WS}$

$S_B = X_B + Y_B + Z_B$

$$A = \begin{bmatrix} \frac{X_R}{S_R} & \frac{X_G}{S_G} & \frac{X_B}{S_B} \\ \frac{Y_R}{S_R} & \frac{Y_G}{S_G} & \frac{Y_B}{S_B} \\ \frac{Z_R}{S_R} & \frac{Z_G}{S_G} & \frac{Z_B}{S_B} \end{bmatrix}$$

Step 4: Find inverse of A

$$Define: \quad A = \begin{bmatrix} a & b & c \\ d & e & f \\ g & h & i \end{bmatrix}$$

Then

$$A^{-1} = Dt \cdot \begin{bmatrix} e \cdot i - f \cdot h & c \cdot h - b \cdot i & b \cdot f - c \cdot e \\ f \cdot g - d \cdot i & a \cdot i - c \cdot g & c \cdot d - a \cdot f \\ d \cdot h - e \cdot g & b \cdot g - a \cdot h & a \cdot e - b \cdot d \end{bmatrix}$$

$$Dt = \frac{1}{(a \cdot e \cdot i - a \cdot f \cdot h - d \cdot b \cdot i + d \cdot c \cdot h + g \cdot b \cdot f - g \cdot c \cdot e)}$$

Step 5: Form normalized white points

$$W_x = X_{nom} / Y_{RGB} \qquad WS_x = X^e_{ws} / Y^e_{ws}$$
$$W_y = 1 \qquad WS_y = 1$$
$$W_z = Z_{nom} / Y_{RGB} \qquad WS_z = Z^e_{ws} / Y^e_{ws}$$

$$Define: \quad A^{-1} = \begin{bmatrix} a & b & c \\ d & e & f \\ g & h & i \end{bmatrix}$$

$$K_R = W_x \cdot a + b + W_z \cdot c$$
$$K_G = W_x \cdot d + e + W_z \cdot f$$
$$K_B = W_x \cdot g + h + W_z \cdot i$$

$$Q_R = WS_x \cdot a + b + WS_z \cdot c$$
$$Q_B = WS_x \cdot d + e + WS_z \cdot f$$
$$Q_B = WS_x \cdot g + h + WS_z \cdot i$$

Step 6: Compute engine calibration parameters

$$ccr = Q_R / K_R$$
$$ccg = Q_G / K_G$$
$$ccb = Q_B / K_B$$

$$offset1 = 1/3 \cdot 255 \cdot \beta - 0.5$$
$$offset2 = 2/3 \cdot 255 \cdot \beta - 0.5$$
$$offset3 = 3/3 \cdot 255 \cdot \beta - 0.5$$

$$Ymin = 64;$$

$$Roffset1 = \lfloor ccr \cdot offset1 + 0.5 \rfloor$$
$$Roffset2 = \lfloor ccr \cdot offset2 + 0.5 \rfloor$$
$$Roffset3 = \lfloor ccr \cdot offset3 + 0.5 \rfloor$$

where $\lfloor\ \rfloor$ is the truncate operator

$$Goffset1 = \lfloor ccg \cdot offset1 + 0.5 \rfloor$$
$$Goffset2 = \lfloor ccg \cdot offset2 + 0.5 \rfloor$$
$$Goffset3 = \lfloor ccg \cdot offset3 + 0.5 \rfloor$$

$$Boffset1 = \lfloor ccb \cdot offset1 + 0.5 \rfloor$$
$$Boffset2 = \lfloor ccb \cdot offset2 + 0.5 \rfloor$$
$$Boffset3 = \lfloor ccb \cdot offset3 + 0.5 \rfloor$$

$$ythres1 = \lfloor 255 + \min(Roffset1, Goffset1, Boffset1) + 0.5 \rfloor$$
$$ythres2 = \lfloor 255 + \min(Roffset2, Goffset2, Boffset2) + 0.5 \rfloor$$

$$ygain = \left\lfloor \frac{255 * (1+\beta) - y\min}{(255 - y\min)} \right\rfloor - 1$$

Step 7: Compute the system transfer function matrix

$$M = \begin{bmatrix} a & b & c & d \\ e & f & g & h \\ i & j & k & l \end{bmatrix}$$

(Note: these are not the same as in step 5)

$$F_R = K_R / (S_R \cdot ELT_R)$$

$$F_G = K_G / (S_G \cdot ELT_G)$$

$$F_B = K_B / (S_B \cdot ELT_B)$$

$$F_{WS} = K_{WS} / (S_{WS} \cdot ELT_{WS})$$

$$a = F_R \cdot X_R \qquad b = F_G \cdot X_G \qquad c = F_B \cdot X_B \qquad d = F_{WS} \cdot \frac{X''_{WS}}{Y''_{WS}}$$

$$e = F_R \cdot Y_R \qquad f = F_G \cdot Y_G \qquad g = F_B \cdot Y_B \qquad h = F_{WS}$$

$$i = F_R \cdot Z_R \qquad j = F_G \cdot Z_G \qquad k = F_B \cdot Z_B \qquad l = F_{WS} \cdot \frac{Z''_{WS}}{Y''_{WS}}$$

Store the RGBY calibration parameters, the matrix M and the ELT's for R,G,B,WS in the color wheel EPROM.

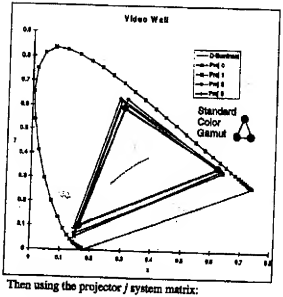
The matrix M and the ELT's for the system define the complete colorimetry of the system. The only remaining variable is the luminance. Each engine now has it's own colorimetry stored with the colorwheel, and given the luminance, the color correction needed to match each engine can be computed.

Given a cube of engines to be matched, the engines could be polled to get each engine's matrix, M'. These could be collected by a master engine, or by an external DSP card, or by an external PC controller.

The next step will be to compute the new color gamut which will be used as the standard to adjust all the engines to. This can be accomplished by finding the largest color gamut triangle which is contained within the color gamut of all the engines. This color gamut can be found by pairing two engines, finding the largest color gamut which is contained within their color gamut. This new color gamut is then paired with all other engines, and a new gamut established from each pairing.

Once found, this new standard color gamut is then used to be the standard to which all projectors are adjusted. The standard color gamut is used to calculate the color correction matrix for each engine. This is accomplished using the following mathematical structure.

Find the standard projector system matrix, M_s, using the techniques of step 5 and step 7. The white of the standard projector can be define as either the average white point of all engines or as an arbitrary white point.



Then using the projector j system matrix:

$$M_j = \begin{bmatrix} a & b & c & j \\ d & e & f & k \\ g & h & i & l \end{bmatrix}$$

we find the inverse of the RGB portion of the matrix:

$$\textit{Define: } C = \begin{bmatrix} a & b & c \\ d & e & f \\ g & h & i \end{bmatrix}$$

Then

$$C^{-1} = Dt \cdot \begin{bmatrix} e \cdot i - f \cdot h & c \cdot h - b \cdot i & b \cdot f - c \cdot e \\ f \cdot g - d \cdot i & a \cdot i - c \cdot g & c \cdot d - a \cdot f \\ d \cdot h - e \cdot g & b \cdot g - a \cdot h & a \cdot e - b \cdot d \end{bmatrix}$$

$$Dt = \frac{1}{(a \cdot e \cdot i - a \cdot f \cdot h - d \cdot b \cdot i + d \cdot c \cdot h + g \cdot b \cdot f - g \cdot c \cdot e)}$$

$$E_j = \begin{bmatrix} ELT_R^N & 0 & 0 \\ 0 & ELT_G^N & 0 \\ 0 & 0 & ELT_B^N \end{bmatrix}$$

$$[E_j]^{-1} = \begin{bmatrix} 1/ELT_R^N & 0 & 0 \\ 0 & 1/ELT_G^N & 0 \\ 0 & 0 & 1/ELT_B^N \end{bmatrix}$$

where N is the given wheel rate.

The color correction matrix for engine j, is given by:

$$CM_j = [E_j]^{-1} \cdot C_j^{-1} \cdot C_T \cdot E_T$$

This matrix can now be downloaded into engine j, and will correct all colors into the gamut defined by $C_T \cdot E_T$. This process can be repeated for each engine in the cube. The engines will now be color corrected, each having the same color gamut.

The next issue will be the luminance levels of the engines. Following color correction of each engine, the luminance level of each engine must be matched. This can be accomplished using either a direct measurement of each engine, or through use of a sensor internal to each engine. This internal sensor could be a sensor placed in the dump light path or other suitable location in which the light is proportional to the lamp output. This sensor could be calibrated in the factory to read a number related to the luminance level of the engine. This luminance level of the each engine would then be used to adjust the gain levels of the RGB matrix.

Additionally, information about the screen color performances could be input into the controller and color correction for screen colorimetric performance could be performed. This could include correction for reduced blue saturation, or general white point movement due to the screen.

As shown in figure 2, the color correction is directed using a master controller. This controller could be a TI DSP, a microcontroller, or an external computer such as a PC, or workstation. The master control processor would be placed within a bus structure which could communicate with each engine, polling for the needed system color transfer matrices, and then returning the color correction matrix. Additionally, the controller could communicate with customer interfaces, and provide inputs for adjustment of the white point of the system, or provide outputs of the lamp status of each engine, (using the luminance data collected from each engine). This could give the customer advanced warning to the need to replace a lamp prior to lamp failure.

The concepts outlined in this disclosure are not only applicable to DLP system using the digital micromirror device (DMD), but are also applicable to other display technologies. These include, but are not limited to, LCD (transmissive, reflective, etc.) , plasma, CRTs, FEDs, laser illumination systems, or led illumination systems. The concepts are also applicable to both rear and front projection display technologies and is not limited to multiple display systems. This concept provides an automatic color management scheme for display technology.

4. When was your solution first conceptually or mentally complete?

[redacted]

5. What is the first tangible evidence of such completion?

This document.

6. What is different about your solution, compared with other solutions to the same problem?

Current systems do not have any information stored which predicts the colorimetry of the projection systems. Therefore, a manual solution is utilized which requires the measurement of each projector, then the computation of each. Many times only the white point is measured which allows only the white point to be matched. With this solution, all color points could be corrected, and no measurements would need to be performed.

7. What are the advantages of your solution?

This process would provide differentiation between the DLP solutions and other projection technology solutions.

8. What TI products, process, projects or operations currently implement your invention?

None.

9. What is the date of first implementation?

No implementation of the idea has been worked on yet, but a spreadsheet simulation of the idea is anticipated.

10. What record exists to prove this date?

N/A

11. Is there any future implementation planned?

Yes, in a spreadsheet simulation of the system.

12. Has the invention been published or disclosed to anyone outside TI (Y/N)

No.

13. Has a TI product incorporating the invention been publicly introduced, quoted, sampled or shipped? (Y/N)

No

When? If planned -- when?

14. Was the invention conceived or first implemented in the performance of a government contract or subcontract? (Y/N) Contract #_____

No

DIVP Patent Disclosure

THE INVENTION DESCRIBED BY THIS DISCLOSURE IS SUBMITTED PURSUANT TO MY EMPLOYMENT WITH TEXAS INSTRUMENTS INCORPORATED OR A TI SUBSIDARY (SPECIFY):

IS THIS A CONFIRMATION OF A PRIOR DISCLOSURE TO THE PATENT DEPARTMENT? (Y/N) No

(Signed) Gregory D. Pettitt [redacted] 8477

Date Mail Station

(Printed) Inventor: Gregory Pettitt

Home Address: 9202 Briarcrest

Rowlett, TX 75088

Employee#: 181599 TI Group/Division/Dept. _DIVP_/_04_/_2400_

Phone#: 972-575-0012 (work) 972-412-4499 (home) Country of Citizenship: USA

(Signed) _____ _____ _____

Date Mail Station

(Printed) Inventor: _____

Home Address: _____

_____

Employee#: _____ TI Group/Division/Dept. _DIVP_/_04_/_____

Phone#: _____ Country of Citizenship: _____

This invention disclosure with any attachments was read and understood by me on [redacted]

Marc Payne [redacted]

Witness Date

This invention disclosure with any attachments was read and understood by me on [redacted]

[redacted] [redacted]

Witness Date

RECEIVED

[redacted]

TI PATENT DEPT

GSP[redacted]

EXHIBIT B

DLP
A TEXAS INSTRUMENTS TECHNOLOGY

DDP1000 Milestone Summary

◆ Summary of Netlist Processing Milestones:

Planned	Actual	
[redacted]	[redacted]	- Initial Req'ments Spec
[redacted]	[redacted]	- First Analysis Netlist
04/25/00	-	Floorplan Netlist # 1
06/06/00	-	Floorplan Netlist # 2
08/01/00	-	Preliminary Netlist
skipped	-	Production* Netlist
skipped	-	RTL
11/20/00	-	RTC
12/14/00	-	RTM
02/14/01	-	First Prototypes

* Altered plan to skip production netlist and just use Preliminary

EXHIBIT C

DLP
A TEXAS INSTRUMENTS TECHNOLOGY

DDP1000 Development Status

VGP Blocks	Engr	Spec	VHDL Code	Initial Synth	Initial Rel	Model	Stim files	Test Matrix	Test Sim
VGP						wip			
TPG	JF	A	**A-cmplt**	**A-cmplt**		**wip**			
DSC	JF	A	A-cmplt	**A-cmplt**		A-cmplt			
BHT	JF	A	A-cmplt	**A-cmplt**		A-cmplt			
NRF	JF	A*	xxx			A-cmplt			
BWE	JF	B	**B-cmplt**	**B-cmplt**		B-cmplt			
CHI	MP	A	**wip**			A-cmplt			
SHP	MP	A	xxx			A-cmplt			
CTI	MP	A	xxx			A-cmplt			
CSC	MP	A	A-cmplt	**A-cmplt**		A-cmplt			
GAM	MP	A	A-cmplt	**A-wip**		A-cmplt			
PCH	JF	A	A-cmplt	**A-cmplt**		A-cmplt			
HCY	MP	B	B-cmplt	**B-wip**		B-cmplt			
PCC	JF	A	**A-cmplt**	**A-cmplt**		A-cmplt			
EDF	MP	A	A-cmplt	**A-cmplt**		A-cmplt			
SCB	MP	A	A-cmplt	**A-wip**		A-cmplt			

* Change pending

Related proceedings appendix:

None.